SERVICE MANUAL
Defender™ Bases:
– Rectangular (H Series)
– Square (Q Series)
– Square Washdown (W series)

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1.1 INTRODUCTION

This service manual contains the information needed for diagnosis and repair of Ohaus Defender Square, Rectangular, and Square Washdown Bases (the H-Q-W Series).
The contents of this manual are contained in five chapters:

Chapter 1 Introduction – Contains information regarding service facilities, tools and test equipment, test masses, specifications, service strategy, and the mechanical and electronic operation of the Base.

Chapter 2 Troubleshooting – Provides guidelines for evaluating the condition and performance of a Base unit, and a standard troubleshooting methodology to follow, as well as a diagnostic guide.

Chapter 3 Maintenance Procedures – Contains preventive maintenance procedures and disassembly, repair and replacement procedures.

Chapter 4 Testing – Contains guides for operational and performance tests and adjustments.

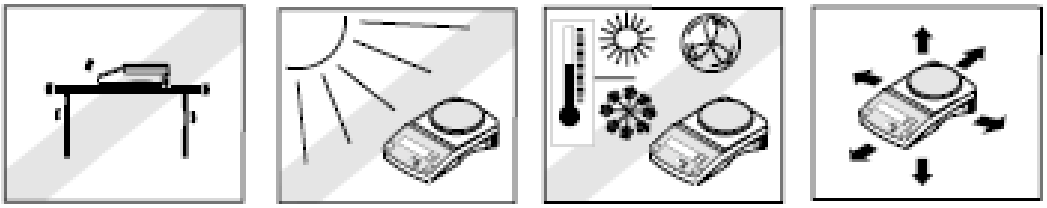
Chapter 5 Drawings and Parts Lists – Contains exploded views of the Defender Bases and parts, identifying all serviceable components.

Before servicing the Base, you should be familiar with the Instruction Manual which is packed with every base.

1.2 SERVICE FACILITIES

To service a Base, the service area should meet the following requirements:

- Clean and level surface.
- Away from magnetic fields such as motors or large transformers.
- Free of vibrations such as fork lift trucks close by, large motors, etc.
- Stable and level work surface.
- Not exposed to direct sunlight or radiating heat sources.



1.3 TOOLS AND TEST EQUIPMENT REQUIRED

1. Common hand tools
2. Standard electronics tool kit
3. Digital Voltmeter (DVM) capable of reading from 1 mv to 50 V dc.)
4. Megohmeter (50 Volt dc maximum test voltage)
5. Desk magnifier on a stand
6. Ohaus Indicator: Defender 3000, 5000, 7000, or equivalent commercial indicator
7. A calibrated Torque Wrench N.m. – Ft/Lbs

1.4 TEST MASSES REQUIRED

The masses required to test the Ohaus Defender H-Q-W Series Bases when connected to an Indicator must meet the requirements of ASTM Class 4 or OIML F2. Mass values 3kg to 300kg, depending on the Base model. The full scale rated capacity of the Base should be used for Span calibration.

1.5 SERVICE STRATEGY

The Load Cells used in Ohaus Bases are non-repairable. The repair method for the Base is direct replacement of Load Cells with connecting cable and hardware.

Each base contains the following basic replaceable assemblies: Platform, Load Cell with Connecting Cable, and Down Stop and mounting hardware. There is an exploded view drawing of the Base and associated parts list in Chapter 5. This service manual contains sufficient information to isolate the problem, replace the component, test and restore the Base to specifications.

1.6 PHYSICAL DESCRIPTION: DEFENDER BASES

Construction	**H and Q Series** (General Purpose Bases): Platform – Stainless steel Frame – Painted Carbon Steel Load Cell – IP 67 Aluminum **W series** (Washdown Bases): Platform – Fabricated stainless steel Scale Base – Formed and welded stainless steel Load Cell – IP 67 Stainless steel
Overloading	Corner Loading – 100% of Full Capacity Safe Overload – 150% of Full Capacity Ultimate Overload – 300% of Full Capacity
Operating Environment	Designed to meet OIML 3000e and NTEP 5000d requirements to operate at a temperature range from –10°C to 40°C / 14°F to 104°F, 0 to 95% relative humidity

1.7 SPECIFICATIONS

Complete specifications for the Ohaus Defender H-Q-W Series Bases are listed in Tables 1-1, through 1-6. When a Base has been serviced, it must meet the specifications listed in the table. Before servicing the Base, determine what specifications are not met.

TABLE 1-1. SPECIFICATIONS FOR DEFENDER RECTANGULAR BASES (Regular)

MODEL: H Series	**D15HR**	**D30HR**	**D60HR**
Capacity	15 kg / 30 lb	30 kg / 60 lb	60 kg / 150 lb
Standard Resolution	1:15000	1:15000	1:12000
Approved Resolution (nmax)	1:3000	1:3000	1:3000
Safe Overload Capacity	150% of capacity		
Load Cell Protection/ Accuracy Class	IP67, single point / C3		
Load Cell Rated Output	2 mV/V ± 10%		
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)		
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms		
Operating Temperature	14°F to 104°F / -10°C to 40°C		
Shift Tolerance new	±1d		
Shift Tolerance Maint.	±2d		
Base Dimensions	12 x 14 in. / 30.5 x 35.5 cm		

TABLE 1-2. SPECIFICATIONS FOR DEFENDER RECTANGULAR BASES (Large)

MODEL: H Series	**D60HL**	**D100HL**	**D150HX**	**D300HX**
Capacity	60 kg / 150 lb	100 kg / 250 lb	150 kg / 300 lb	300 kg / 600 lb
Standard Resolution	1:12000	1:10000	1:15000	1:15000
Approved Resolution (nmax)	1:3000	1:3000	1:3000	1:3000
Safe Overload Capacity	150% of capacity			
Load Cell Protection/ Accuracy Class	IP67, single point / C3			
Load Cell Rated Output	2 mV/V ± 10%			
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)			
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms			
Operating Temperature	14°F to 104°F / -10°C to 40°C			
Shift Tolerance new	±1d			
Shift Tolerance Maint.	±2d			
Base Dimensions	15.7 x 19.7 in. / 40 x 50 cm		16.5 x 21.6 in. / 42 x 55 cm	

1.7 SPECIFICATIONS

TABLE 1-3. SPECIFICATIONS FOR DEFENDER SQUARE BASES (Regular)

MODEL: Q Series	D10QR	D15QR	D25QR	D30QR	D50QR
Capacity	10 kg / 25 lb	15 kg / 30 lb	25 kg / 50 lb	30 kg / 60 lb	50 kg / 100 lb
Standard Resolution	1:10000	1:15000	1:12500	1:15000	1:10000
Approved Resolution (nmax)	1:5000	1:3000	1:5000	1:3000	1:5000
Safe Overload Capacity	150% of capacity				
Load Cell Protection/ Accuracy Class	IP67, single point / C3				
Load Cell Rated Output	2 mV/V ± 10%				
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)				
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms				
Operating Temperature	14°F to 104°F / -10°C to 40°C				
Shift Tolerance new	±1d				
Shift Tolerance Maint.	±2d				
Base Dimensions	12 x 12 in. / 305 x 305 mm				18 x 18 in. / 457 x 457 mm

TABLE 1-4. SPECIFICATIONS FOR DEFENDER SQUARE BASES (Large)

MODEL: Q Series	D60QL	D100QL	D150QL	D250QX	D300QX
Capacity	60 kg / 150 lb	100 kg / 250 lb	150 kg / 300 lb	250 kg / 500 lb	300 kg / 600 lb
Standard Resolution	1:12000	1:10000	1:15000	1:12500	1:15000
Approved Resolution (nmax)	1:3000	1:5000	1:3000	1:5000	1:3000
Safe Overload Capacity	150% of capacity				
Load Cell Protection/ Accuracy Class	IP67, single point / C3				
Load Cell Rated Output	2 mV/V ± 10%				
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)				
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms				
Operating Temperature	14°F to 104°F / -10°C to 40°C				
Shift Tolerance new	±1d				
Shift Tolerance Maint.	±2d				
Base Dimensions	18 x 18 in. / 457 x 457 mm			24 x 24 in. / 61 x 61 cm	

1.7 SPECIFICATIONS

TABLE 1-5. SPECIFICATIONS FOR DEFENDER SQUARE WASHDOWN BASES (Regular)

MODEL: W Series	D10WR	D15WR	D25WR	D30WR	D50WR
Capacity	10 kg / 25 lb	15 kg / 30 lb	25 kg / 50 lb	30 kg / 60 lb	50 kg / 100 lb
Standard Resolution	1:10000	1:15000	1:12500	1:15000	1:10000
Approved Resolution (nmax)	1:5000	1:3000	1:5000	1:3000	1:5000
Safe Overload Capacity	150% of capacity				
Load Cell Protection/ Accuracy Class	IP67, single point / C3				
Load Cell Rated Output	2 mV/V ± 10%				
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)				
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms				
Operating Temperature	14°F to 104°F / -10°C to 40°C				
Shift Tolerance new	±1d				
Shift Tolerance Maint.	±2d				
Base Dimensions	12 x 12 in. / 305 x 305 mm				18 x 18 in. / 457 x 457 mm

TABLE 1-6. SPECIFICATIONS FOR DEFENDER SQUARE WASHDOWN BASES (Large)

MODEL: W Series	D60WL	D100WL	D150WL	D250WX	D300WX
Capacity	60 kg / 150 lb	100 kg / 250 lb	150 kg / 300 lb	250 kg / 500 lb	300 kg / 600 lb
Standard Resolution	1:12000	1:10000	1:15000	1:12500	1:15000
Approved Resolution (nmax)	1:3000	1:5000	1:3000	1:5000	1:3000
Safe Overload Capacity	150% of capacity				
Load Cell Protection/ Accuracy Class	IP67, single point / C3				
Load Cell Rated Output	2 mV/V ± 10%				
Load Cell Excitation Voltage	Maximum 20V (AC/DC) / Recommended 5~15V (AC/DC)				
Load Cell Input/Output Resistance	410 ± 10 ohms / 350 ± 4 ohms				
Operating Temperature	14°F to 104°F / -10°C to 40°C				
Shift Tolerance new	±1d				
Shift Tolerance Maint.	±2d				
Base Dimensions	18 x 18 in. / 457 x 457 mm			24 x 24 in. / 61 x 61 cm	

1.8 HOW LOAD CELLS OPERATE

Load Cells are devices that convert force into a signal. Defender Bases have a Strain Gauge Load Cell, which is made from a metal beam with holes drilled in it. Strain gauges are affixed to the beam at the top and bottom to measure changes in the beam due to deflection. The gauges are bonded very securely to the metal, where they sense very small deflections in the metal caused by the load being applied to the cell. Because the signal levels are very small, the circuit is protected from all outside influences such as moisture, physical damage, or electrical interference.

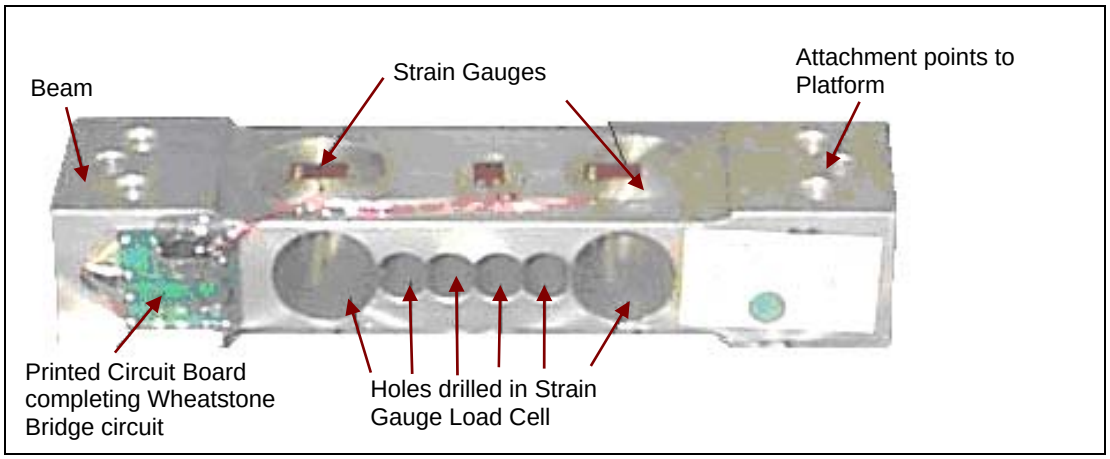

Beam
Strain Gauges
Attachment points to Platform
Printed Circuit Board completing Wheatstone Bridge circuit
Holes drilled in Strain Gauge Load Cell

Figure 1-1. Strain Gauge Load Cell.

The strain gauges are wired into a Wheatstone Bridge Circuit. (See Figure 1-2.)

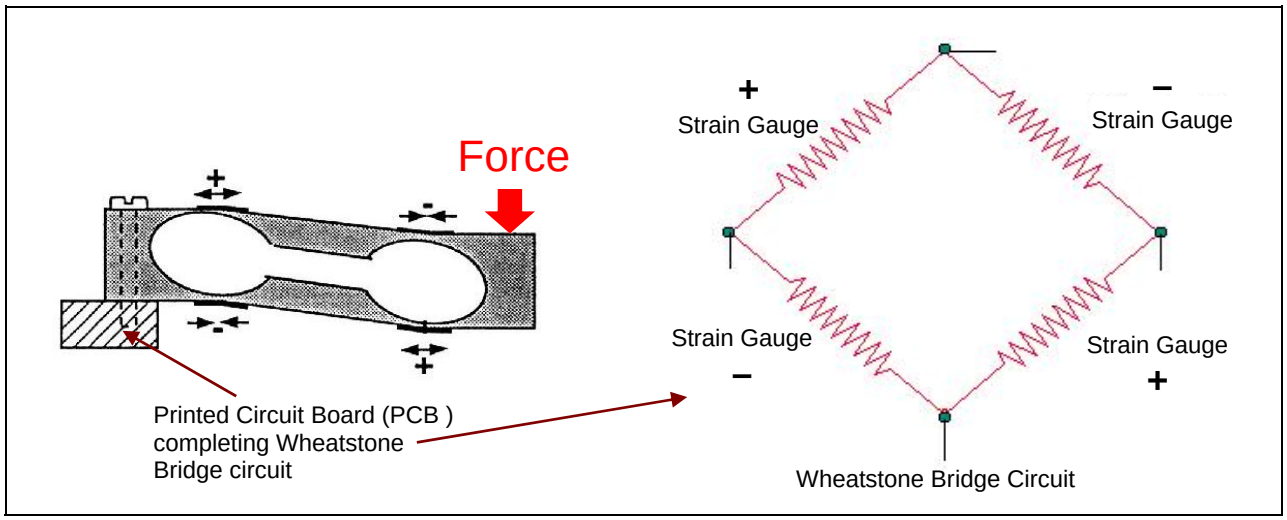


Figure 1-2. Downward force on the Platform bends the beam, causing two gauges to stretch and two to compress in opposition, changing the electrical resistance of the circuit.

At zero load, all strain gauges are unstressed. Weight placed on the Platform bends the beam, causing two gauges to stretch and two to compress in opposition, changing the electrical resistance of the circuit.

1.8 HOW LOAD CELLS OPERATE

The difference in the output signal before and after the mass was placed on the platform is taken, interpreted and displayed.

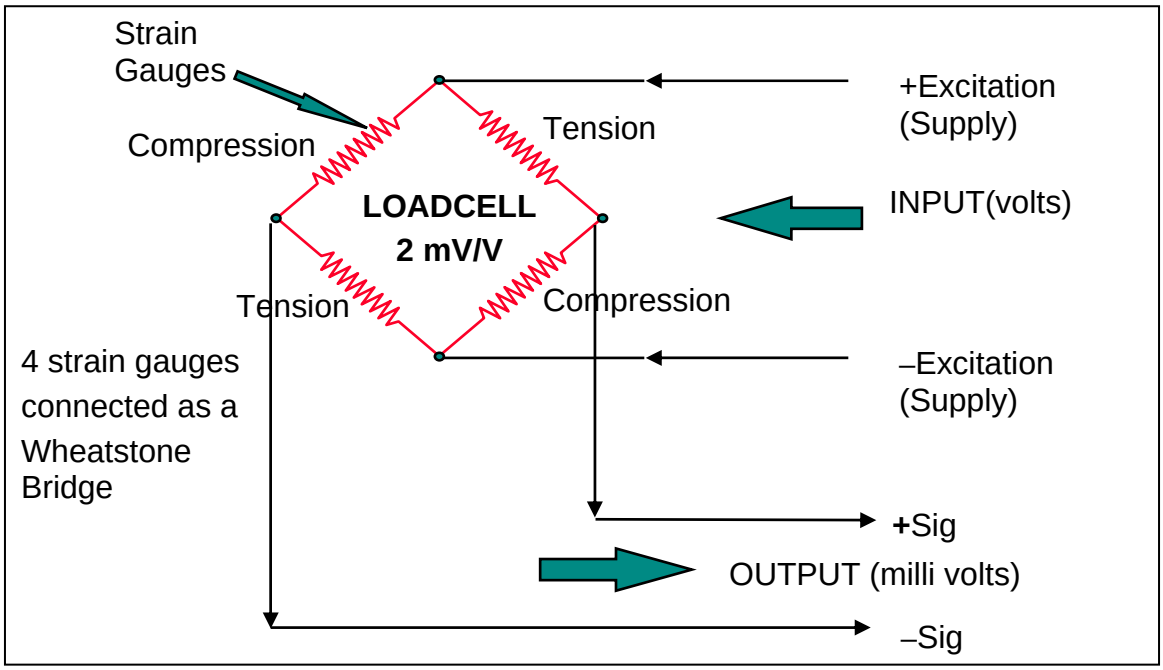


Figure 1-3. Route of electrical Load Cell input and output through Wheatstone Bridge circuit.

A Load Cell is a force sensor, which receives a voltage (excitation) from a regulated power source in the Indicator, and sends back a low-voltage milli-volt (mV) relative to the force applied. The Load Cell signal is read by the Indicator, which converts it to a numeric value and shows it visually. This output value increases as weight is loaded to the Load Cell.

For example, a 500kg Load Cell with 2mV/V output and 5V excitation would have a change of 0.02mV per kg change in the load, that is, 10mV/500=0.02mV per kg. At a load of 250kg the signal voltage would thus increase by 5mV from the value measured at no load.

2.1 TROUBLESHOOTING

This section of the manual provides guidelines for evaluating the condition and performance of a scale Base, and a standard troubleshooting methodology to follow.

2.1.1 Checking Load Cells for Trouble

1. **Visual Check:**
   - Remove the plastic shipping tabs from between the upper and lower Housings, if present.
   - Clean the unit before evaluating any mechanical problems. In some cases, debris may have accumulated inside the Base Housing. Make sure there is no buildup of any foreign material.

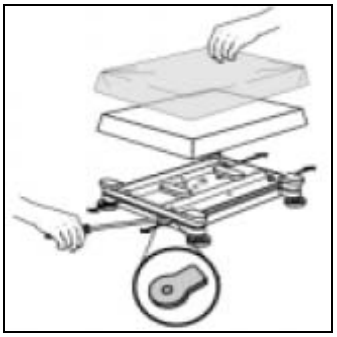


Figure 2-1. Removing plastic shipping tabs.

   - Examine the Base Housing for dents, bent Platform or signs of physical abuse that could cause the Base to malfunction. Make sure that the proper Platform is supplied with the Base. Replace all damaged parts. See Chapter 5 for parts identification.
   - Remove the Platform from the Base. Check that the Overload Stops are not touching the Top Plate. (See Figure 5-1, Chapter 5.) This would restrict movement, causing improper operation of the Base. If the Overload Stops are improperly set, adjust them. (See Section 3.3.)
   - Check the metal surfaces of the Platform. All surfaces should be parallel. If the platform is deformed, it should be replaced.
   - Check the cables leading to the Load Cell for cuts, abrasions or other signs of excessive wear and tear.
   - Check for a bent or twisted Load Cell: Place the top surface and then each of the sides of the Load Cell on a flat surface, to see if it rests flat and even. A gap indicates a bent or twisted Load Cell.
   - Examine the Load Cell for corrosion due to high humidity or exposure to chemicals.
   - A Load Cell that is even slightly bent or corroded should be replaced.
2. **Perform a Resistance Test**, to determine if the Load Cell is severely damaged or a short circuit to the frame has occurred. (See Chapter 4 for details.)
3. **Perform an Output Voltage Test**: Measure the no load, 50% load and full load output. The reading should meet the Load Cell specifications. (See Chapter 4.)
   - The Load Cell output should be very close to linear over its capacity range.

3.1 PREVENTIVE MAINTENANCE

Ohaus bases should be carefully handled, stored in a clean, dry area, and cleaned periodically. Follow these precautionary steps:

- When a base has had chemicals or liquids spilled on it, all exterior surfaces should be cleaned as soon as possible with warm water on a damp cloth.
- Do not leave a mass on the base when it is not in use.
- Allow time for the base to stabilize after moving it from an area which is at a different temperature than the area where it is to be operated. Allow one hour for each 5°F (2.7°C) temperature change before using the base.

3.1.1 Preventive Maintenance Checklist

The scale should be inspected and checked regularly, as follows:

1. Clean the base.
2. Remove the Platform to inspect and clean the area beneath the Platform.

CAUTION
DO NOT USE CHEMICAL CLEANERS OR SOLVENTS OF ANY TYPE.
SOME CLEANERS ARE ABRASIVE AND MAY AFFECT THE BASE'S FINISH.

3. Check the Load Cell cable for broken or damaged insulation.
4. Make a visual inspection as detailed in Chapter 2.

3.2 Replacing the Load Cell

A Load Cell that is even slightly bent or corroded should be replaced. The Load Cell may also need to be replaced because of instability, or because the scale does not calibrate or repeat, or because it is physically broken.

1. Remove the scale Platform and disconnect the Base from the Indicator.
2. Remove the four Load Cell Mounting Bolts and washers that secure the Top Frame to the Load Cell.
3. Set the Top Frame and the Load Cell Spacer aside.

Figure 3-1. Four Mounting Bolts that secure the Top Frame to the Load Cell.

3.2 Replacing the Load Cell

4. Remove the bottom Load Cell Mounting Bolts, washers and spacer. The Load Cell assembly can now be removed from the Lower Frame.

5. Install the new Load Cell following steps 1 through 4 in reverse order.

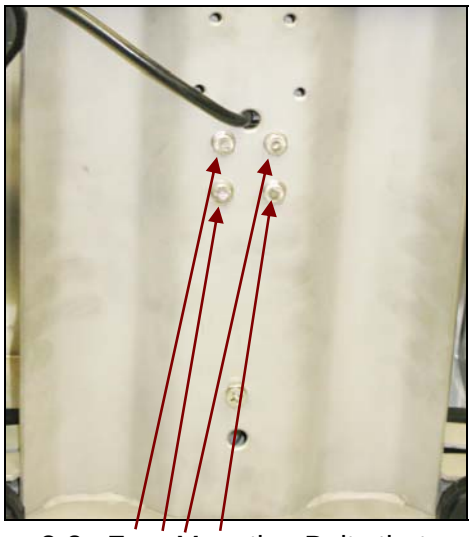


Figure 3-2. Four Mounting Bolts that secure the Bottom Frame to the Load Cell.

3.3 Overload Stop Adjustments

The Overload Stop gaps must be checked and reset if the Load Cell is replaced.

1. Remove the Platform and loosen the Jam Nuts, first on the four Overload Stops on the top side of the Frame, then on the bottom. (See Figures 3-3, 3-4 and 3-5.)

2. Use the appropriate size feeler gauge in the Gap (see Table 3-1), and turn the set screws until a slight drag is felt on the feeler gauge.

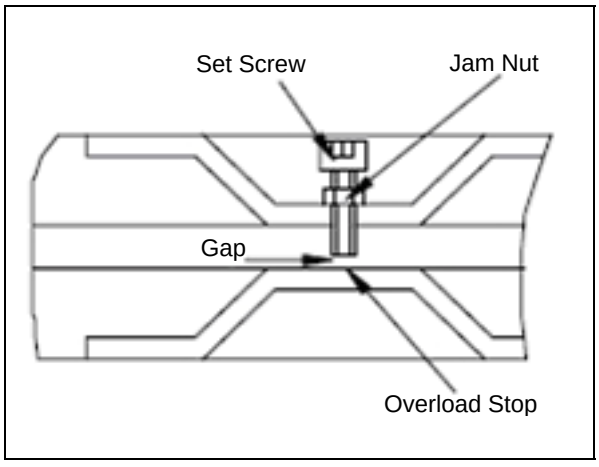


Figure 3-3. Overload Gap Setting.

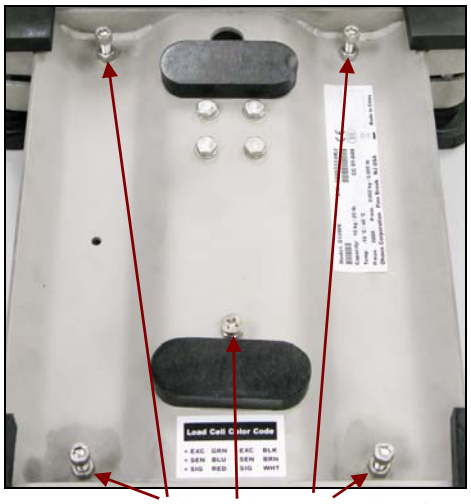


Figure 3-4. Location of top Overload Stops.

3.3 Overload Stop Adjustments

3. Tighten the Jam Nut and re-check the Gap.
4. Re-adjust if necessary.
5. Cover the Platform and check for full capacity. (See Table 3-1 for Gap settings.)

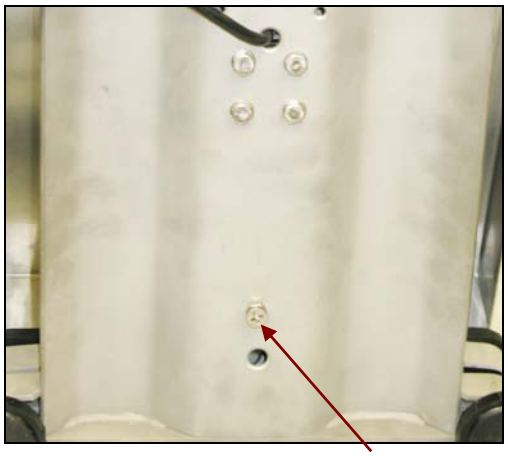


Figure 3-5. Location of bottom Overload Stop.

TABLE 3-1. OVERLOAD GAP SETTINGS FOR DEFENDER H-Q-W BASES

Model	Overload Stop (Corner)	Overload Stop (Center)
D15HR	2mm (0.78in.)	0.5mm(0.02in.)
D30HR	2mm (0.78in.)	0.5mm(0.02in.)
D60HR	3mm (0.118in.)	0.5mm(0.02in.)
D60HL	3mm (0.118in.)	0.75mm(0.03in.)
D100HL	3mm (0.118in.)	0.75mm(0.03in.)
D150HX	4mm (0.157in.)	1mm (0.04in.)
D300HX	4mm (0.157in.)	1mm (0.04in.)
D10QR	2mm (0.78in.)	0.8mm (0.3in.)
D25QR	2mm (0.78in.)	0.8mm (0.3in.)
D50QL	3mm (0.11in.)	1mm (0.4in.)
D100QL	4mm (0.157in.)	1mm (0.4in.)
D250QX	6mm (0.23in.)	1mm (0.4in.)
D10WR	2mm (0.78in.)	0.8mm (0.31in.)
D25WR	2mm (0.78in.)	0.8mm (0.31in.)
D50WL	3mm (0.11in.)	1mm (0.04in.)
D100WL	4mm (0.157in.)	1mm (0.04in.)
D250WX	6mm (0.23in.)	1mm (0.04in.)

4.1 TESTING

Before and after servicing a Defender Base, conduct Load Cell Resistance Checks, Calibration using an external Indicator, and Performance Tests to confirm that the base meets specifications. Allow time for the base to stabilize after moving it from an area which is at a different temperature than the area where it is to be operated. Allow one hour for each 5°F (2.7°C) temperature change before using the base.

The following tests require a Digital Multimeter, an Indicator and hand tools. The Digital DC Voltmeter should have a reading range from 1 mV to 50 V full-scale. It should be capable of reading differences of one micro-volt per increment. The indicator can be either the Ohaus Defender 5000, or an equivalent commercial indicator.

NOTE:
Make sure the test area is free from drafts and that the base rests on a level and vibration-free surface.

4.2 Load Cell Resistance Checks

Use an ohm-meter to measure across each pair of wires, and compare the results with Table 4-1. The Load Cell must be completely disconnected from the Indicator and at no load when these tests are made.

Note: The cable fitting for the H and Q series Bases has seven pins, as shown in Figure 4-1. Pin 1 is EX+, Pin 3 is S+, Pin 5 is S –, Pin 7 is EX –. The wires are color coded on the W series. The Load Cell label shows the wire color code for the Load Cell.

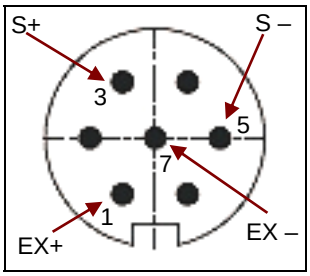


Figure 4-1. Resistance elements on H and Q series Bases.

In addition to the four resistance elements which make up the Wheatstone Bridge, there are commonly one or two resistors in the excitation lines. The resistance across the excitation wires is usually the highest resistance measured across any two wires.

If the resistance readings are in the range specified, skip to the next section. If they are incorrect – for example, outside the expected range, open circuit or short-circuit across any two wires – the likely causes are a damaged or faulty Load Cell or incorrect or faulty wiring. If the Load Cell is defective, replace it. (See Chapter 3.)

TABLE 4-1. LOAD CELL RESISTANCE READINGS (in Ohms)

Models	**Ex+ to Ex–**	**S+ to S–**	**Ex+ to S–**	**Ex+ to S+**	**Ex– to S+**	**Ex– to S–**
H Series	410 ± 10	350 ± 4	313 ± 10	313 ± 10	262.5 ± 10	262.5 ± 10
Q Series	410 ± 10	350 ± 4	313 ± 10	313 ± 10	262.5 ± 10	262.5 ± 10
W Series	387 ± 10	350 ± 4	297 ± 10	297 ± 10	262.5 ± 10	262.5 ± 10

4.3 Calibration with an External Indicator

1. Install the Load Cell. (See Section 3.2.)
2. Connect the excitation, signal shield and sensing wires (if provided), to the Indicator. Calibrate the Indicator to read the load in the units required, for example, kilograms or grams. (Consult the Indicator instruction manual for calibration procedures.) For calibration mass weights, see Table 1-1, in Chapter 1.
3. Check that the Indicator is reading correctly over a range of values.

4.4 Consistency Check

To check the system prior to installation, make the following measurements. (Also make these checks if the Load Cell will not calibrate, or if the Indicator does not read correctly, or is giving unstable readings.)

1. Using a voltmeter, measure and record the excitation voltage supplied by the Indicator. Most Ohaus indicators supply 5 volts dc for the excitation voltage.
2. Using an mV meter, measure and record the signal voltage with no load on the base.

CAUTION:
IN THE NEXT STEP, DO NOT OVERLOAD THE BASE BEYOND FULL CAPACITY RATING.

3. Using an mV meter, measure and record the signal voltage at the loads shown in Table 4-2.
4. Compare the measured output readings with the theoretical values from the Load Cell data. (See Table 4-2.)

4.4 Consistency Check

TABLE 4-2. LOAD CELL OUTPUT READINGS (in mV with 5V Excitation)

Model/Capacity	Zero Load	50% Load	100% Load
D15HR/15kg	1.3 ± 1.0	Zero + 2.8	Zero + 5.6
D30HR/30kg	1.1 ± 1.0	Zero + 2.55	Zero + 5.1
D60HR/60kg	0.7 ± 1.0	Zero + 3.1	Zero + 6.2
D60HL/60kg	0.7 ± 1.0	Zero + 3.1	Zero + 6.2
D100HR/100kg	1.3 ± 2.0	Zero + 2.7	Zero + 5.4
D150HR/150kg	0.53 ± 2.0	Zero + 2.5	Zero + 5
D300HL/300kg	0.34 ± 2.0	Zero + 3	Zero + 6
D10QR/10kg	4.3 ± 2.0	Zero + 2.3	Zero + 4.7
D25QR/25kg	1.6 ± 2.0	Zero + 2.8	Zero + 5.6
D50QR/50kg	1.7 ± 2.0	Zero + 2.4	Zero + 4.8
D100QL/100kg	1.3 ± 2.0	Zero + 2.7	Zero + 5.4
D250QX/250kg	0.34 ± 2.0	Zero + 2.5	Zero + 5
D10WR/10kg	4.3 ± 2.0	Zero + 2.3	Zero + 4.7
D25WR/25kg	1.6 ± 2.0	Zero + 2.8	Zero + 5.6
D50WR/50kg	1.7 ± 2.0	Zero + 2.4	Zero + 4.8
D100WL/100kg	1.3 ± 2.0	Zero + 2.7	Zero + 5.4
D250WX/250kg	0.34 ± 2.0	Zero + 2.5	Zero + 5

4.5 Performance Tests

Accurate performance of the Defender Bases is determined by two tests. Compare the displayed readings with the tolerances listed in the Specifications Tables in Chapter 1.

NOTE:

The following performance tests are used to evaluate base operation before and after repairs. The base must meet the requirements specified in each test as well as the specifications listed in Table 1-2. Before proceeding with the following tests, the indicator should be calibrated. (See Section 4.3.)

4.5.1 Off Center Load (Shift) Test

The Shift Test is made before and after a Base has had the Load Cell replaced and adjustments have been made that affect its performance. The Shift Test verifies that all sections of the Base weigh within specified tolerance.

If the Base does not pass the Shift Test, verify that the Overload Stops are properly set. (See Section 3.1.) If the Shift Test cannot be passed, the Load Cell must be replaced.

Prior to starting this test, the Base must be connected to a properly functioning Indicator, with capacity and readability values set according to the specifications for the Base under test.

1. Place test weights equal to one third of the Base's capacity sequentially at each of the positions A, B, C, and D, as shown in Figure 4-1. Note the indicator reading at each position. (For Base capacity, see Table 1-1.)

2. Check the variation between mass weights and indicator reading against specified Shift Tolerance in Table 1-1.

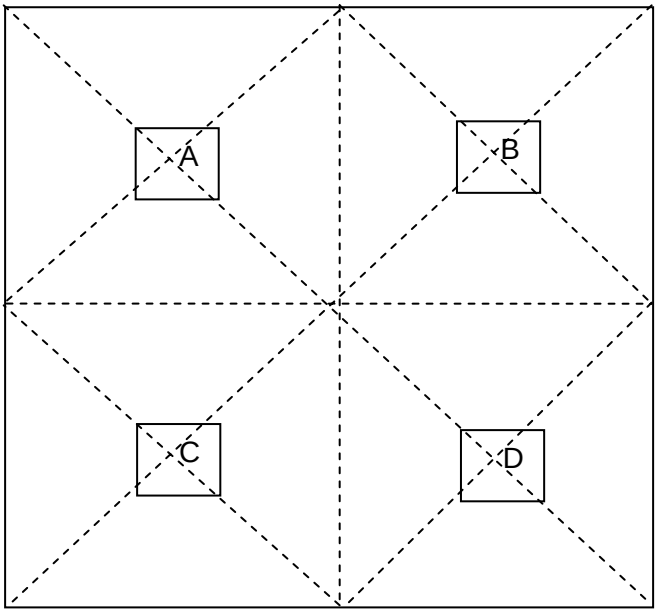


Figure 4-2. Positions A, B, C and D are centered at each quarter of the base platform.

4.5.2 Adjusting Off Center Load

If the Off Center Load (Shift) is excessive, perform adjustment as follows:

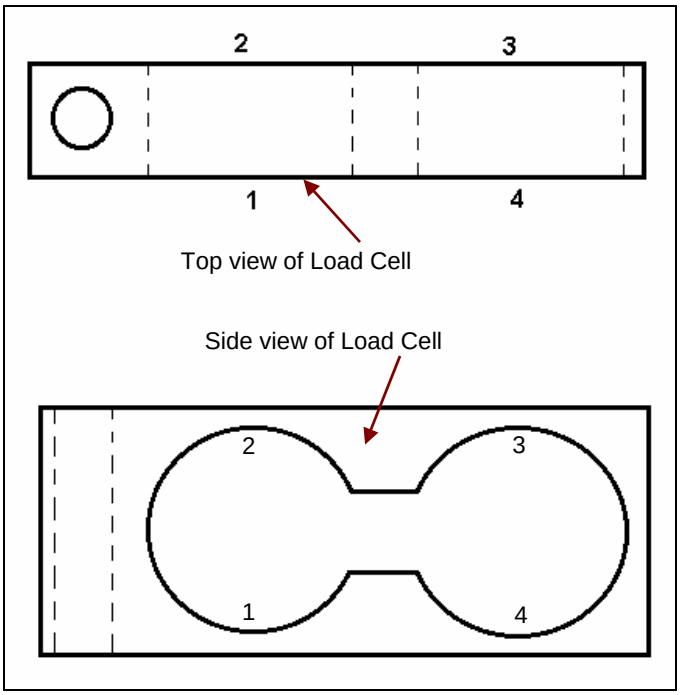


Figure 4-3. Off Center Load adjustment points.

1. Place the test weight in the center of the Platform.
2. Tare the indicator.
3. Move the weight to point A and record the reading.
4. Move the weight to point B and record the reading.
5. Move the weight to point C and record the reading.
6. Move the weight to point D and record the reading.
7. If the reading at point A is negative, file at points 1 and 4 AT AN ANGLE.
8. If the reading at point B is negative, file at points 1 and 2 STRAIGHT ACROSS.
9. If the reading at point C is negative, file at points 2 and 3 AT AN ANGLE.
10. If the reading at point D is negative, file at points 3 and 4 STRAIGHT ACROSS.

Note: It is not recommended that you try to adjust more than –5 counts if the beam has been filed already. If the beam has not been filed previously, you can adjust –10 counts. Remember, when filing you are weakening the beam. File a little at a time.

4.5.3 Full Load Test

1. After the Off Center Load Test has been passed, test the Base's full capacity according to the Specification Tables 1-1 through 1-6. The Base must meet all specifications as listed.

2. If the Base fails the Full Load Test, check and set the Overload Stops. (See Section 3.3.)

This section of the manual contains exploded views for the Defender H-Q-W Bases. The exploded view drawings are designed to identify the parts which can be serviced in the field.

NOTE:

In all cases where a part is replaced, the base must be thoroughly checked after the replacement is made. The base **MUST** meet the parameters of all applicable specifications in this manual.

If further technical information is needed, please contact your local Ohaus office or:

Ohaus Corporation, www.ohaus.com
19A Chapin Road
P.O. Box 2033
Pine Brook, NJ 07058-2033 USA

Tel: 973-377-9000
Fax: 973-593-0359

In the United States call toll free, 800-526-0659 between 8:00 a.m. and 6:00 p.m. EST.

5.1 DEFENDER RECTANGULAR (H) BASES: PARTS

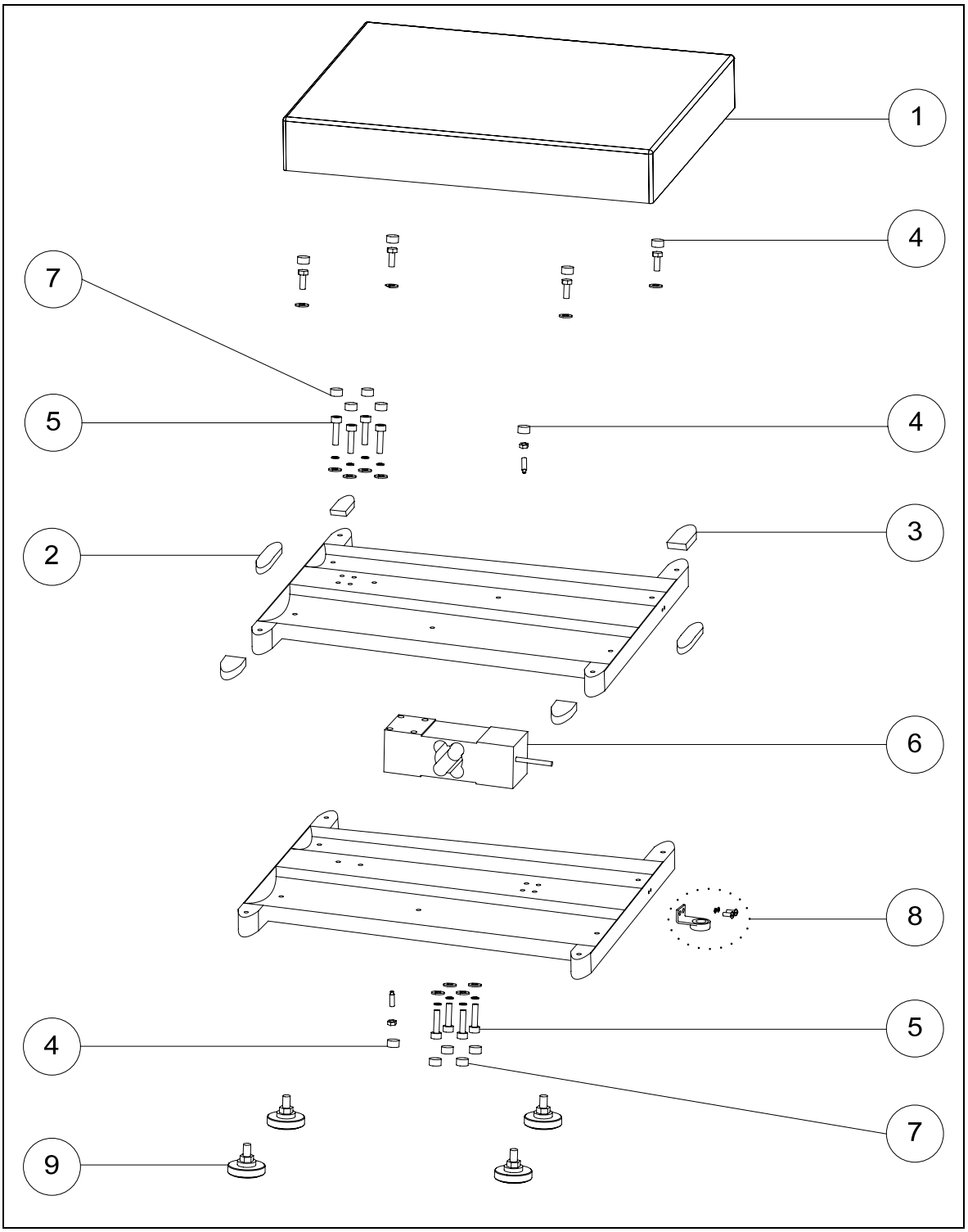


Figure 5-1. Defender Rectangular (H) Bases: Parts

5.1 DEFENDER RECTANGULAR (H) BASES: PARTS

TABLE 5-1. DEFENDER RECTANGULAR (H) BASES: PARTS

Drawing Item	Description
1	Pan
2	Rubber Center Load Pad
3	Rubber Corner Load Pad
4	Overload Stop Jam Nuts and Set Screws
5	Load Cell Mounting Bolt
6	Load Cell
7	Load Cell Mounting Washers
8	Level Kit
9	Leveling Feet

When replacement parts are needed, refer to the spare part list for the model you are servicing. Parts lists are available from your local Ohaus office, or visit Ohaus.com.

5.2 DEFENDER SQUARE (Q & W) BASES: PARTS

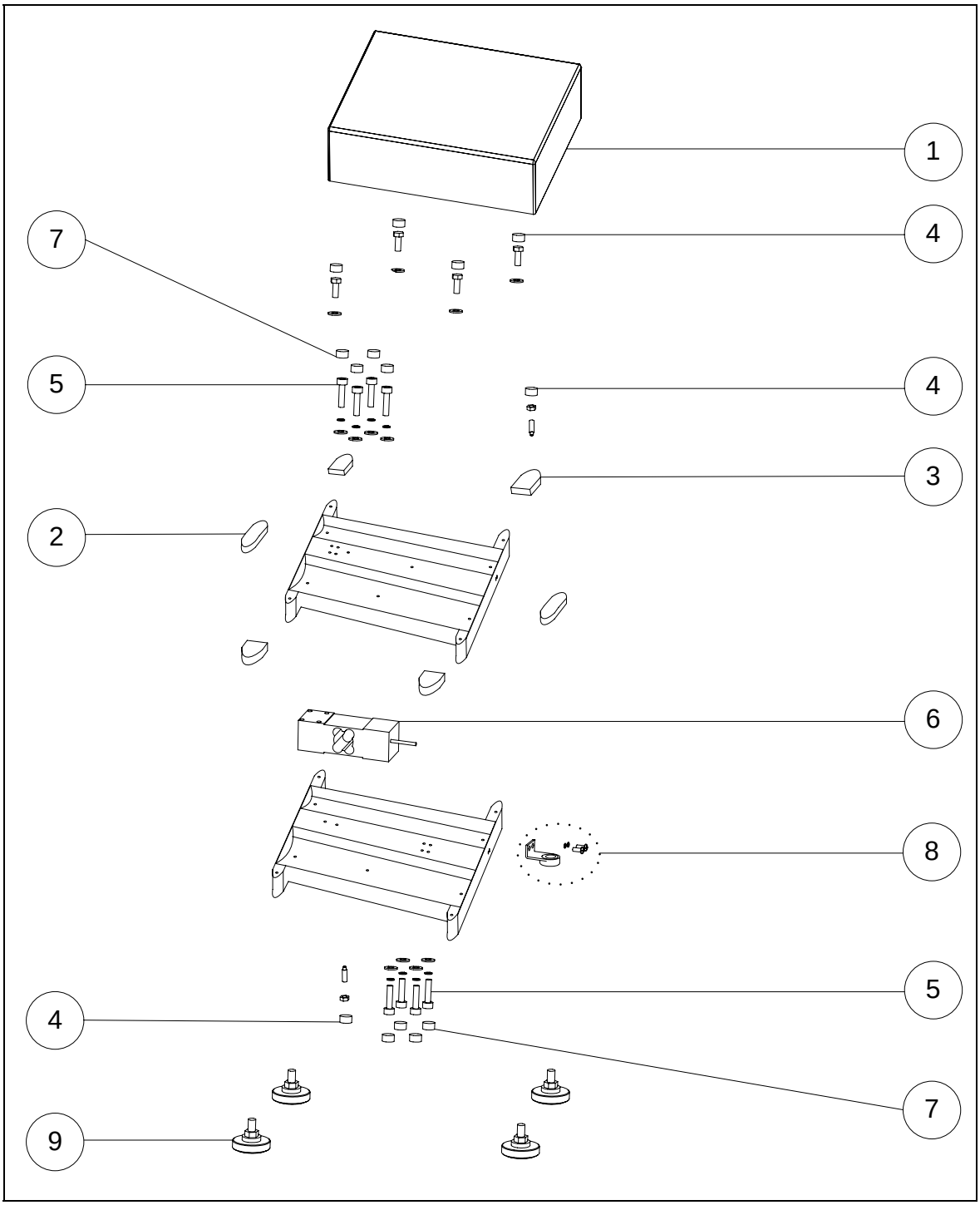


Figure 5-2. Defender Square (Q & W) Bases: Parts

5.2 DEFENDER SQUARE (Q & W) BASES: PARTS

TABLE 5-1. DEFENDER SQUARE (Q & W) BASES: PARTS

Drawing Item	Description
1	Pan
2	Rubber Center Load Pad
3	Rubber Corner Load Pad
4	Overload Stop Jam Nuts and Set Screws
5	Load Cell Mounting Bolt
6	Load Cell
7	Load Cell Mounting Washers
8	Level Kit
9	Leveling Feet

APPENDIX A. GLOSSARY

Ohaus Load Cells contain a specification label on the Load Cell itself.

Compensated Temperature Range
The range of temperatures over which the output from the cell is compensated. If used outside this range the output cannot be guaranteed to follow the specifications.

Environmental Protection
IP rating against moisture and dust, for example, IP 65.

Excitation
Voltage applied to the Exe+ and Exe– leads of the load cell.

Input Resistance
The resistance measured across Exe+ and Exe– with load cell disconnected and no load.

Insulation Resistance
Normally measured at 50 V dc, this is the minimal resistance between the metal body of the load cell and any of its electrical connections.

Mechanical Failure
The load at which the cell is likely to fail mechanically, that is, break or deform.

mV/V
Usually the output from a load cell will be approximately 0m V at zero load, though typically there may be a small offset voltage at zero load. Over the full rated capacity of the load cell, the mV output will change. The amount by which it changes depends upon the resistance change in the cell and on the excitation voltage applied. Since the load cell manufacturer does not know what excitation voltage will be applied to the cell, rather than quote the V output over full range, they will quote the milli-Volt output per volt of excitation, or in its short form, mv/V. Most Ohaus Indicators provide an excitation voltage of 5 Volts dc.

Output Resistance
The resistance measured across S+ plus and S– with load cell disconnected and no load.

Overload Capacity
The maximum load that can be applied without permanent damage. Loads in excess of maximum capacity will cause damage to the load cell.

Rated Capacity
The maximum load over which the load cell will operate within its specifications.

Rated Output
The nominal mV/V output of the load cell.

Ultimate Capacity
This is a percentage setting, usually 300% of full capacity.

Zero Balance
The output of the load cell at no load, normally quoted as a percentage of full load. Also known as zero offset.

P/N 80252596 SERVICE MANUAL: DEFENDER™ H-Q-W SERIES BASES